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IN THE UNITED STATES PATENT AND TRADEMARKS OFFICE

Applicant: Xuan Truong NGUYEN

Serial No: 663,397

Filing Date: March 1, 1991

Title: RECYCLING WASTE CELLULOSIC MATERIAL

DECLARATION

I, Xuan Truong NGUYEN, being the Inventor named in that above identified Application declare as follows:

1. THAT I am Manager-Chemical Pulping and Bleaching of Domtar Inc. which position I have held for three years; and previously I was Senior Research Scientist of Domtar Inc. in the field of chemical pulping and bleaching; and I have spent 17 years as a scientist in the fields of pulp manufacture, pulp bleaching and recovery of chemicals employed in pulp manufacture and bleaching.

2. THAT I made the invention described and claimed in the above identified U.S. Patent Application.

3. THAT the Examples set forth in the Specification of this Application were carried out by me personally or under my direction.

4. THAT the method of the invention produces a pulp of good viscosity, more especially greater than 10, which can be employed as the sole fiber component of paper and this was a surprising and completely unexpected discovery, completely contrary to the conventional wisdom in the art which has been that repulping or reslushing of waste papers, for example, corrugated paper board, produces pulp of

inferior quality which can only be employed when blended with virgin pulp.

5. THAT I have considered the Netherlands Patent Specification 7408641 which describes two processes for producing pulp from waste paper, one involving sodium or ammonium sulphite with sodium carbonate, which represents an acidic cooking liquor, and the other involving sodium hydroxide which is an alkaline liquor.

6. THAT under my direction disgestion of old corrugated cardboard waste having a kappa number of 86 and an original viscosity of 26 cp was carried out employing a sulphite digesting liquor as disclosed in the Netherlands Patent, and a temperature of 166°C for 3 to 4 hours with a chemical charge of sodium sulphite of 6.3% and 12.6%, and the resulting pulps had kappa numbers of 69 and 62 respectively with viscosities of 7.9 cp and 5.4 cp respectively. In these experiments the more severe pulping conditions produce the lower kappa number, i.e., 62, but also produce the still lower viscosity 5.4 cp, and it would be expected that more severe sulphite pulping would result in still lower kappa pulp and still lower viscosity.

7. THAT I have considered the Examples in the Netherlands Patent which relate to the use of an alkaline cooking liquor, i.e., sodium hydroxide; although I am unable to read Dutch, it is a relatively easy matter to identify the Examples which employ sodium hydroxide, i.e., the alkaline cooking and those which employ sodium sulphite, i.e., the acidic cooking. Examples III, VI, VII, VIII and IX of the Netherlands Patent employ the alkaline cooking and

provide values for the tensile breaking length, burst factor and tear factor of papers produced from the resulting pulp.

8. THAT in the Table below I have set out the values of tensile breaking length, burst factor and tear factor of the afore-mentioned Examples in the Netherlands Patent; in the case of the tensile breaking length I have set forth the figure in kilometers; in the case of the burst factor, I have multiplied the values in the Netherlands Patent by a factor of 10 to provide the burst factor in the North American scheme.

TABLE

Example	Tensile Breaking Length	Burst Factor	Tear Factor
III	2.8km	15.3	45
VI	1.81km	21.8	76
VII	3.7km		
VIII	3.8km	25.3	76.3
IX	2.93km	12.9	26.9

9. THAT the Examples in the Patent Specification for the present Application identify only the viscosities of the pulps produced, the viscosities being a normally accepted value of a pulp indicating the strength of the paper which can be produced. Nevertheless, when the Examples were carried out papers were produced from the pulp. In the case of Examples 6, 7 and 12 of the Specification, the pulp product was used to produce 60 g/m^2 standard hand sheets and employing standard paper testing methods such sheets values for tensile breaking length , a burst factor and tear factor were recorded. These results are shown in the Table below:

TABLE

Example	Tensile Breaking Length	Burst Factor	Tear Factor
6	7.35 km	48.5	126
7	6.25 km	45.3	128
12	7.05 km	54.2	117

All of these values are markedly higher than the highest values achieved in the Examples of the Netherlands Patent (Example VIII of the Netherlands Patent exhibits the highest values). Indeed the values achieved from the pulp of Example 6 of the present invention are almost double the highest values achieved in Example VIII of the Netherlands Patent.

10. THAT I have considered the English language abstract and the Tables in the Japanese Patent 167475; this Japanese Patent employs a temperature range lower than the temperature range required in the present invention and the pulps are described as being blended with other pulps which follows the conventional wisdom that pulps from repulped or reslushed waste papers are not suitable as the sole fiber component of paper. I have also noted the viscosity values in the Table at page 4 of the Japanese Patent, based on TAPPI T-230. The values of 6.4 and 6.2 cp are typical of viscosities achieved by prior art procedures such as that of the Japanese Patent and it is generally recognized that pulps with low viscosities of this order can not be employed as the sole fiber component of paper, but instead such pulps can only be employed when blended with virgin pulp.

The Table at page 4 also shows breaking lengths of 4.88 and 4.96 by JIS P8113-76 which is generally equivalent

to the tests employed to develop the breaking length figures recorded in paragraph 9 above, these figures being inferior to those achieved in the present invention.

The values in the two bottom rows of Table 2 (top right-hand corner of page 4, of Japanese Patent), which are also recorded in Figures 3 and 4 are measures of the level of contamination of the pulp; the recorded values of 60, 90 and 70, 100 $mm^2/100g$ indicate to me that the pulp products obtained were very "dirty", have a high level of contaminants and would not be suitable as the sole source of pulp for paper manufacture.

11. THAT I have considered Murphy, U.S. Patent 3,440,134 which describes an alkaline digestion of waste paper to produce a yield of 85 to 90% and a potassium permanganate number of 14/25 ml. This latter number is equivalent to a kappa number of about 21. It is evident to me that to achieve yields of the order of 85 to 90% means that a relatively low amount of lignin has been removed and consequently if the final pulp has a kappa number of 21 this means that the waste paper which was employed as a starting material also had a relatively low kappa number. In order to obtain a pulp with a kappa number of 21 at 85 to 90% yield employing the soda pulping process described by Murphy, the original kappa of the paper would have to be in the 40 to 60 range.

I hereby declare that all statements made herein of my own knowledge are true and that all statements on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable

by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the Application or any Patent issued therein.

DATED this 6TH day of JAN , 1992

Xuan Truong Nguyen

Xuan Truong Nguyen